

USSR

UDC 542.91+661.718.1

PUDOVIK, A. M., TERENT'YEVA, S. A., and PUDOVIK, M. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR

"The Reaction of Amidophosphites with the N-Phenylamide of Acrylic Acid"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No 3, Mar 71, pp 645-646

Abstract: The reaction of the diethylamide of diethylphosphorous acid (I) with the phenylamide of acrylic acid (II) at 125-30° resulted in the formation of N,N-diethylamidoethyl-N,N-ethylphenylcarbamoylethylphosphonate (III):

$$(EtO)_2PNEt_2 (I) + CH_2=CHCONHPh (II) \rightarrow Et_2NP(O)CH_2CH_2CON(Ph)Et (III).$$

 III (b p 159-60° at 3×10^{-3} mm) was obtained with a yield of 64%. Similarly, the tetraethyldiamide of ethylphosphorous acid reacted with II with the formation of the tetraethyldiamide of N,N-ethylphenylcarbamoylethylphosphonic acid $(Et_2N)_2P(O)CH_2CH_2CON(Et)Ph$ (IV). Compound IV (b p 165-7° at 2×10^{-3} mm) was isolated in 24% yield. Compound II did not react with hexaethyltriaminophosphine or 2-ethoxy-N-methyl-1,3,2-oxazaphospholane. Under the action of II, the latter compound underwent ring opening and homopolymerization. Alkyl halides have a similar effect on oxazaphospholanes. 1/1

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UDC 661.718.1 + 542.955

PUDOVIK, M. A., TERENT'YEVA, S. A., and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR

"Reactions of 2-Alkoxy(Alkyl)-4,5-benzo-1,3,2-oxazaphospholanes With Nitriles and Esters of α,β -Unsaturated Carboxylic Acids"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 12, Dec 73, pp 2619-2621

Abstract: 2-Alkoxy(alkyl)-4,5-benzo-1,3,2-oxazaphospholanes react with nitriles and esters of α,β -unsaturated carboxylic acids in absence of catalysts. The reactions occur with a migration of hydrogen atom yielding 2-alkyl-2-alkoxy(alkyl)-4,5-benzo-1,3,2-oxazaphospholenes-2.

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UDC 661.718.1

PUDOVIK, M. A., and PUDOVIK, A. N., Institute of Organic and Physical
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"Synthesis of 2-Oxo-3-phenyl-1,3,2-oxazaphospholanes"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 10, Oct 73, pp 2144-2147

Abstract: To a solution of 2-chloro-3-phenyl-1,3,2-oxazaphospholane in benzene a mixture of water, triethylamine and tetrahydrofuran is added dropwise. After 24 hrs storage and removal of triethylamine hydrochloride, a viscous mass is obtained which becomes crystalline; after recrystallization from benzene the 2-oxo-3-phenyl-1,3,2-oxazaphospholane (I) melts at 86-87°. Two other approaches via hydrolysis or acidolysis of 2-diethylamino-3-phenyl-1,3,2-oxazaphospholane failed to yield pure (I). Geometrical isomerism has been noted in a series of five membered phosphites containing a nitrogen atom in the ring, from the analysis of ¹H and ³¹P NMR data.

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UDC 661.718.1

PUDOVIK, M. A., and PUDOVIK, A. N., Institute of Organic and Physical
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"Synthesis of 2-Oxo-1,3,2-diazaphospholanes"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 10, Oct 73, pp 2147-2149

Abstract: To a solution of 0.05 g-mole of 2-chloro-1,3-dialkyl-1,3,2-diazaphospholane in 60 ml of anhydrous benzene a mixture of 0.05 g-mole water, 0.05 g-mole triethylamine, and 15 ml tetrahydrofuran was added at 10-20°. After 12 hrs at room temperature the base hydrochloride and the solvent were removed, the residue distilled in high vacuum yielding 2-oxo-1,3-dialkyl-1,3,2-diazaphospholanes -- colorless liquids. The NMR and IR spectral characteristics of these compounds have been investigated.

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PUDOVIK, M. A., TERENT'YEVA, S. A., and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Acad. Sc. USSR

"Reaction of 2-Alkoxy-4,5-benzo-1,3,2-oxazaphospholanes With Hexaalkyl-triaminophosphines"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 8, Aug 73, p 1860

Abstract: Heating 2-alkoxy-4,5-benzo-1,3,2-oxazaphospholanes with hexaalkyltriaminophosphines at 120-140° leads to the formation of oxazaphospholanes with a geminal system P-N-P. A mixture of 10 g of 2-methoxy-4,5-benzo-1,3,2-oxazaphospholane and 9.7 g hexamethyltriaminophosphine was heated to 110-130° for 1 hr yielding 47% of 2-methoxy-3-bis(dimethylamino)-phosphino-4,5-benzo-1,3,2-oxazaphospholane, b.p. 111°/0.007 mm, d_4^{20} 1.1577, n_D^{20} 1.5610. In a similar fashion, starting from 2-isopropoxy-4,5-benzo-1,3,2-oxazaphospholane and hexaethyltriaminophosphine, 2-isopropoxy-3-bis-(diethylamino)phosphino-4,5-benzo-1,3,2-oxazaphospholane was obtained, b.p. 130°/0.025 mm, d_4^{20} 1.0744, n_D^{20} 1.5338.

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Nitrogen Compounds

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UDC 547.794:543.51

USSR

YETREMOV, YU. YA., MUSIN, R. A., PUDOVIK, M. A., and KIBARDINA, L. K., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, USSR Academy of Sciences, Kazan

"Mass Spectra of Some 1,3,2-Oxazaphospholines"

Riga, Khimiya Geterotsiklicheskikh Soyedineniy, No 7, 1973, pp 894-897

Abstract: "Mass spectra of 1,3,2-oxazaphospholanes made it possible to determine the pathways of dissociative ionization from the intensity of m/e lines. Intensity of the $m/e = M$ line decreased with an increase in the number of C atoms in the alkoxy radical. Dissociative ionization involved breaking of C-C and P-O bonds in the ring and loss of R'CHO from the molecular ion. The olefin molecule was primarily formed from the alkoxy group. Loss of the alkoxy group was the most likely process of dissociative ionization of the molecular ion; in the case of the 2-chloro derivative it was the loss of the Cl atom.

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UDC 541.67+447.31+538.27

SAMITOV, YU. YU., PUDOVIK, M. A., KHAYAROV, A. I., and KIBARDINA, L. K.

"Stereochemistry of Organophosphorus Compounds. III. Nuclear Magnetic Resonance Spectra of ^1H and ^{31}P and the Geometric Isomerism in a Series of 1,2,3-oxazaphospholanes"

Leningrad, Zhurnal Obshchey Khimii, Vol XLIII (CV), No 1, 1973, pp 46-51

Abstract: In containing the studies in the field of the stereochemistry of phosphorus-containing hetero cycles, the presence of stereoisomers in the series of substituted 1,3,2-oxazaphospholanes was detected in which isomerism is caused by the presence of the chiral carbon atom in the ring and the mentioned property of the PIII phosphorus atom. The proof of the presence of the stereoisomers was obtained by the method of gas-liquid chromatography and nuclear magnetic resonance, the conformation of the high-element ring was established by analysis of the nuclear magnetic resonance spectra. The series of 5-ethyl-1,3,2-oxazaphospholanes which are tabulated were synthesized and investigated. The predominant conformation of the 5-member heterocycle is the form of the envelope with the oxygen atom at the top of the vent.

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USSR

UDC 547.26'118

PUDOVIK, A. N., PUDOVIK, M. A., and IVANOVA, L. K., Institute of Organic and Physical Chemistry Imeni A. Ye. Arbuzov, Acad. Sc. USSR

"Reactions of 1,3,2-Diazaphospholanes With Acyl Halides"

Leningrad, Zhurnal Obshchey Khimii, Vol 42 (104), No 9, Sep 72, pp 1906-1910

Abstract: A series of 2-substituted N,N-di-tert-butyl-1,3,2-diazaphospholanes was synthesized. It was shown that, depending on the substituent at the phosphorus atom of diazaphospholanes, the reactions with acyl halides may occur with retention or breaking of the ring, forming derivatives of 3- or 4-coordinated phosphorus atom. With an exocyclic dialkylamino group the principal reaction is the exchange reaction with retention of the ring. Introduction of an alkoxy group makes the phosphorus atom a nucleophilic center, and the reaction goes via the Arbuzov rearrangement. In case of the 2-phenoxy derivatives of diazaphospholanes the reactions occur via one of the cyclic nitrogen atoms breaking the ring and forming derivatives of 3-coordinated phosphorus atom.

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USSR

PUDOVIK, A. N., PUDOVIK, M. A., TERENT'YEVA, S. A., and GOL'DFARB, E. I.,
Institute of Organic and Physical Chemistry Imeni A. Ye. Arbuzov, Acad. Sc.
USSR

"Reactions of the Derivatives of Trivalent Phosphorus With Orthoaminophenol"

Leningrad, Zhurnal Obshchey Khimii, Vol 42 (104), No 9, Sep 72, pp 1901-1906

Abstract: A mixture of isopropylphosphorous acid tetraethyldiamide and o-aminophenol was heated for 1-2 hrs at 130-140° to yield 2-isopropoxy-4,5-benzo-1,3,2-oxaazaphospholane (I), b.p. 95-97°/0.03 mm, m.p. 58-60°, and 1,6-dioxo-4,9-diaza-2,3,7,8-dibenzo-5-phosphaspiro[4,4]nonane, m.p. 161-162°. 2-Ethoxy-4,5-benzo-1,3,2-oxaazaphospholane, b.p. 77-78°/0.03 mm, d_4^{20} 1.1948, n_D^{20} 1.5553 was obtained in an analogous manner. Sulfur added to molten (I) followed by heating for one hour at 100° gave 2-isopropoxy-2-thia-4,5-benzo-1,3,2-oxaazaphospholane b.p. 120-130°/0.03 mm, m.p. 92-94°. It has been shown that 2-ethyl-4,5-benzo-1,3,2-oxaazaphospholane undergoes protropic isomerization on storage, converting to 2-ethyl-4,5-benzo-1,3,2-oxaazaphospholene-2.

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UDC 547.26'118

USSR

PUDOVIK, M. A., TERENT'YEVA, S. A., MEDVEDEVA, M. D., and PUDOVIK, A. N.,
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of Sciences, USSR

"N-Acetylated Oxazaphospholanes and Phosphorinanes"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 3, Mar 73, p 679

Abstract: Heating equimolar quantities of N-acylated aminoalcohols or N-acetyl-o-aminophenol with complete amides of phosphorous acid or with the diamides of alkylphosphorous acids yielded a series of 2-substituted 3-acetyl-1,3,2-oxazaphospholanes and phosphorinanes: 2-diethylamino-3-acetyl-4,5-benzo-1,3,2-oxazaphospholane, b.p. 114-115°/0.04 mm; 2-ethoxy homologue, b.p. 95-96°/0.08 mm; 3-isopropoxy homologue, b.p. 109-111/0.05 mm; 2-diethylamino homologue, b.p. 92-93° (0.1 mm), and 2-diethylamino-3-acetyl-1,3,2-oxazaphosphorinane, b.p. 100-102°/0.025 mm.

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PUDOVIK, A. N., TEREENT'YEVA, S. A., and PUDOVIK, M. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR

"The Reaction of Amidophosphites with the N-Phenylamide of Acrylic Acid"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No 3, Mar 71, pp 645-646

Abstract: The reaction of the diethylamide of diethylphosphorous acid (I) with the phenylamide of acrylic acid (II) at 125-30° resulted in the formation of N,N-diethylamidoethyl-N,N-ethylphenylcarbamoylethylphosphonate (III):
 $(\text{EtO})_2\text{PNet}_2 \text{ (I)} + \text{CH}_2=\text{CHCONHPh} \text{ (II)} \rightarrow \text{Et}_2\text{P}(\text{O})(\text{CH}_2\text{CH}_2\text{CON(Ph)Et}) \text{ (III)}.$

III (b.p. 159-60° at 3×10^{-3} mm) was obtained with a yield of 64%. Similarly, the tetraethyldiamide of ethylphosphorous acid reacted with II with the formation of the tetraethyldiamide of N,N-ethylphenylcarbamoylethylphosphonic acid $(\text{Et}_2\text{N})_2\text{P}(\text{O})(\text{CH}_2\text{CH}_2\text{CON(Et)Ph}) \text{ (IV)}$. Compound IV (b.p. 165-7° at 2×10^{-3} mm) was isolated in 24% yield. Compound II did not react with hexaethyltriaminophosphine or 2-ethoxy-N-methyl-1,3,2-oxazaphospholane. Under the action of II, the latter compound underwent ring opening and homopolymerization. Alkyl halides have a similar effect on oxazaphospholanes. 1/1

USSR

UDC 593.27

KAUKOV, V. A., GOLYAYEVA, N. A. and PUDOVIK, M. A.; Institute of Organic and Physical Chemistry named A. Ye. Arbusov, USSR Academy of Sciences, Kazan'

"Electron-Diffraction Study of the Structure of the N,N'-Dimethyl-2-Chloro-1,3,2-Dioxaphospholane Molecule"

Moscow, Doklady Akademii Nauk SSSR, Vol. 203, No. 3, 1972, pp 590-592

Abstract: There is experimental evidence to suspect significant lability of the P — Cl bond length in various compounds containing a tricoordinated phosphorus atom. To clarify this situation (relation of bond length to change in the immediate vicinity of the P atom, the structure of the N,N'-dimethyl-2-chloro-1,3,2-dioxaphospholane molecule, in which the P atom is directly bound with two nitrogen atoms, was studied. F. RAZUMSKII's method (1967) was used to synthesize this compound, for which intensity and radial curves $I(s)$ and $I(r)$ were obtained, the peaks being associated with various bond lengths, and these in turn being used to analyze possible configurations of the molecule ("envelope" and "armchair" types). The envelope model, with axial P — Cl bond and equatorial position of methyl groups, was indicated by the data obtained; also, valence angles of $\text{HPCl} = 100^\circ$, $\text{CCN} = 108^\circ$, $\text{CH}_3\text{N} = 116^\circ$, etc. Comparisons were made with other known data for seven chlorides of this group.

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MAUMOV, V. A., et al., Doklady Akademii Nauk SSSR, Vol. 203, No 3, 1972,
pp 590-592

Distinct lability of the P — Cl bond length is supported by these data, but
marked differences between several subgroups in this respect remain unexplained.

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USSR

PUDOVIK, A. N., ~~PUDOVIK, M. A.~~ TERENT'YEVA, S. A., and BEL'SKIY, V. Ye.,
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USSR Academy of Sciences

"Reaction of 1,3,2-Oxaazaphospholanes With Alcohols and Mercaptans"

Leningrad, Zhurnal Obshchey Khimii, Vol 41, No 11, Nov 1971, pp 2,407-2,413

Abstract: This is a continuation of an earlier study in which the authors demonstrated that 1,3,2-oxaazaphospholanes with a dialkylamino group at the phosphorus atom are readily subject to alcoholysis, with formation of the corresponding alkoxy derivatives; here the reaction of certain derivatives of the 1,3,2-oxaazaphospholanes with alcohols and mercaptans is studied. Derivatives tested were 2-ethoxy-4-methyl-N-methyl-1,3,2-oxaazaphospholane, 2-ethoxy-N-phenyl-1,3,2-oxaazaphospholane, 2-propoxy-1,3,2-oxaazaphospholanes, 2-chloro-N-phenyl-1,3,2-oxaazaphospholane, and 2-diethylamino-N-phenyl-1,3,2-oxaazaphospholane; reactants were ethyl and propyl alcohols, phenylaminoethanol, aliphatic mercaptans, propyl mercaptan and thiophenol. It was found that replacement of the alkyl group at the nitrogen atom of the phospholane ring with a phenyl group leads to definite stabilization of the

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PUDOVIK, A. N., et al., Zhurnal Obshchey Khimii, Vol 41, No 11, Nov 1971, pp 2,407-2,413

ring; further, the above-indicated reactions with aliphatic mercaptans proceed with elimination of sulfur from the mercaptans and formation of the corresponding thion derivatives. The reaction with thiophenol produces thiophosphite; that with benzylmercaptan, both thiophosphite and dithiophosphate.

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USSR

UDC 541.6.547.1'118

RAYEVSKIY, O. A., KHALITOV, F. G., and PIMOVIK, M. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, USSR Academy of Sciences

"Conformation of O-Methyl(Phenyl)-Methylchlorophosphonates"

Moscow, Izvestiya Akad. Nauk SSSR, Seriya Khimicheskaya, No 1, Jan 72, pp 173-175

Abstract: As a continuation of their earlier study of the effect of the nature of substitutes on the conformation position of the ester group in compounds of the general formula $R_2R_3P(O)OR$, the authors take up the problem of the identification of conformers in the O-methyl(phenyl)-methylphosphonates.

Infrared spectra show that for these compounds, stabilization of one conformer is a characteristic feature. The dipole-moment method is used to establish that such conformation can occur either with a form having the cis-position of the bonds $P=O$ and $O-CH_3$, or one having the gauche-position (projection of OC coming between PO and PCL).

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RAYEVSKIY, O. A., KHALITOV, F. G., and PUDOVIK, M. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR

"Conformation of Some Methylphenylphosphinic Acid Esters"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No 11, Nov 71, pp 2595-2598

Abstract: The authors used the methods of IR spectroscopy and dipole moments to study the conformation of the methyl, phenyl and para-nitrophenyl esters of methylphosphinic acid. These compounds are characterized by stabilization of the gauche position of the ether group relative to the phosphoryl group. A choice between two different gauche forms cannot be made in this series of compounds because of the closeness of the moments of the P-CH₃ and P-Ph bonds. It is suggested that one of the causes of gauche form stability is the possibility of competition between mobile electrons of the benzene ring and ether oxygen to fill vacant 3d orbitals of the phosphorus atom.

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USSR

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SHAGDULLIN, R. R., SHALIROV, I. KH., PUDOVIK, M. A., and TEREENT'YEVA, S. A.,
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Sciences USSR, Kazan'

"Vibrational Spectra and Structure of Some Oxaazaphospholanes"

Riga, Khimiya Geterotsiklicheskikh Soyedineniy, No 12, Dec 71, pp 1612-1615

Abstract: A series of 2-chloro-2-oxo-1,3,2-oxaazaphospholanes was synthesized and their spectra were studied. To 15.3 g phosphorus oxychloride in 150 ml benzene kept at 15-20°, a mixture of 20.2 g triethylamine and 8.9 g 1-methyl-aminopropanol-2 was added dropwise with stirring. The reaction mixture was stirred for 2 hrs, the triethylamine hydrochloride was separated, benzene was evaporated, and the residue was vacuum-distilled, yielding 2-chloro-2-oxo-3,5-dimethyl-1,3,2-oxaazaphospholane, b.p. 90°/0.1 mm, d_4^{20} 1.2853, n_D^{20} 1.4602.

Analogously the 2-chloro-2-oxo-3-phenyl-1,3,2-oxaazaphospholane, m.p. 96-97° and 2-chloro-2-oxo-5-methyl-3-phenyl-1,3,2-oxaazaphospholane, m.p. 114-115° were obtained. IR spectra for model compounds have been reproduced, and band assignments have been made. On the basis of the changes observed in characteristic frequencies, going from trivalent phosphorus compounds to tetracoordinated ones, 1/2

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SHAGIDULLIN, R. R., et al., Khimiya Geterotsiklicheskikh Soyedineniy, No 12,
Dec 71, pp 1612-1615

a conclusion was reached that changes in the ring conformation must have taken place: in the trivalent phosphorus compounds the ring is in form of an envelope with a pseudoaxial chlorine atom, while in the tetracoordinated phosphorus compounds an envelope is formed with a axial phosphoryl oxygen atom and an equatorial chlorine atom.

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"Reaction of 1,3,2-Oxazaphospholanes With Glycols"

Leningrad, Zhurnal Obshchey Khimii, Vol 41, No 10, 1971, pp 2177-2180

Abstract: In a continuing study of the five-membered phosphorus heterocycles, the reactions of 2-diethylamino-N-phenyl-1,3,2-oxazaphospholane (I) have been investigated with glycol, 1,2- and 1,3-propanediols. The product of the reaction with glycol was identified as 2- β -(phenylamino)ethoxy-1,3,2-dioxaphospholane (II) on the basis of NMR and IR spectra and the elemental analysis data. The structure of (II) was confirmed by identity of its NMR and IR spectra with those of the reaction product of 2-diethylamino-1,3,2-dioxaphospholane with phenylaminoethanol and by the IR spectrum of the acetylation product of (II). The mechanism of (I) reaction with glycol may involve formation of an

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PUDOVIK, A. N., et al, Zhurnal Obshchey Khimii, Vol 41, No 10, 1971, pp 2177-2180

intermediate 2- β -(hydroxyethoxy)-N-phenyl-1,3,2-oxazaphospholane which then rearranges to a spiran derivative which in turn changes to (II). The spiran derivative was detected in the reaction product of 2-chloro-N-phenyl-1,3,2-oxazaphospholane with glycol ethylamine and also in (II) after one month's storage. The final products of the (I) reactions with 1,2- and 1,3-propanediol were 2-(β -(phenylamino)ethoxy-4-methyl-1,3,2-dioxaphospholane and 2-(β -(phenylamino)ethoxy-1,3,2-dioxaphosphorinane, respectively. The experimental procedures are described and IR spectra of (II) are shown.

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USSR

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PUDOVIK, A. N., PUDOVIK, M. A., IVANOVA, L. K., Institute of Organic and Physical Chemistry imeni A. YE. Arbuzov, Academy of Sciences USSR

"Reaction of 1,3,2-Oxazaphospholanes With Chloral"

Leningrad, Zhurnal Obshchey Khimii, Vol 41, No 10, 1971, pp 2180-2184

Abstract: The study of the interaction between 1,3,2-oxazaphospholanes with different substituents at the P atom and chloral was prompted by the previously reported discovery of strong insecticidal activity of some phosphates prepared by the reaction of dioxaphospholanes with chloral. All reactions were conducted in an ether solution with cooling. The reactions of chloral with 2-diethylamino-N-phenyl-, 2-phenoxy-N-methyl-, 2-ethoxy- or 2-propoxy-N-methyl-, or N-phenyl-1,3,2-oxazaphospholanes, all with only one ester bond in the ring, led, via ring opening, to the formation of, respectively, β , β -dichlorovinyl N,N-diethyl-N',N'-(β -chloroethyl)phenylphosphorodiamidate (I), phenyl, ethyl, or 1/2

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PUDOVIK, A. N., et al, Zhurnal Obshchey Khimii, Vol 41, No 10, 1971, pp 2180-2184

propyl β, β -dichlorovinyl N,N-(β -chloroethyl)methylamidophosphates (II, III, IV), and ethyl or propyl β, β -dichlorovinyl N,N-(β -chloroethyl)phenylamidophosphates (V, VI). In contrast to 1, 3, 2-oxazaphospholanes, the reaction of 2-propoxy-N,N'-di(sec-butyl)-1,3,2-diazaphospholane with chloral proceeds without ring opening. In contrast to dioxaphosphorinanes, 2-alkoxy-1, 3,2-oxazaphosphorinanes give with chloral open-chain products, e.g., β, β -dichlorovinyl N-(γ -chloropropyl)amidophosphate with a strong intermolecular hydrogen bond. The structure of the cited reaction products was determined by IR and NMR spectra. The spectra of (III) are given, physical constants and formulas of I-VI compounds are tabulated, and preparation procedures are described. The II-VI compounds exhibited a good fungicidal activity at a sufficiently high toxicity.

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Organophosphorous Compounds

USSR

ISHMAEVA, Z. A., PUDOVIK, M. A., TERENTEVA, S. A., and Associate Member of the USSR Academy of Sciences PUDOVIK, A. N., Kazan State University imeni V. I. Ulyanov-Lenin

"Determination of the P-N Bond Dipole Moment"

Moscow, Doklady Akademii Nauk SSSR, Vol 196, No 3, 21 Jan 71, pp 630-632

Abstract: The dipole moments of 1,3,2-oxaazaphospholanes with a tricoordinated phosphorus atom were determined experimentally and compared to calculated values, assuming valence angles of O-P-N 95° , O-C-C and N-C-C 108° . A value of 0.26D for the dipole moment of the P-N bond in the direction from the phosphorus to the nitrogen atom gave best agreement between experimental results and calculations made for a model for N-phenyl-2-methyl-1,3,2-oxaazaphospholane and for N-phenyl-2-ethyl-5-methyl-1,3,2-oxaazaphospholane. The polarity of the molecule was in agreement with the coplanar nature of the 5-membered ring. The dipole moments of 1,3,2-oxaazaphospholanes with a tetra-coordinated phosphorus atom were determined. Assuming that the heterocycle is also planar in this case, the dipole moment of the P-N bond was calculated. It was found that the change in hybridization of the phosphorus atom has a $1/2$

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ISHMAEVA, Z. A., et al, Doklady Akademii Nauk SSSR, Vol 196, No 3, 21 Jan 71, pp 630-632

profound effect on the dipole moment of the P-N bond, which was found to be equal to 0.99-1.13D. Also, insertion of a methyl group into the 5-membered ring changes the conformation of the ring.

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PUDOVIK, A. N., PUDOVIK, M. A., SHULYNDINA, O. S., and NAGAYEVA, KH.
KH., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov,
Academy of Sciences USSR

"2-Substituted N-Phenyl(benzyl)-1,3,2-oxaazaphospholanes"

Leningrad, Zhurnal Obshchey Khimii, Vol 40, No 7, Jul 70, pp 1477-1480

Abstract: The interaction of phosphorus trichloride with β -phenyl-(benzyl)aminoethanol gives 2-chloro-N-phenyl(benzyl)-1,3,2-oxaazaphospholane. These acid chlorides readily react with alcohols, secondary amines to form corresponding amides and esters. The same products are obtained by a transesterification reaction -- transamidation of some trivalent phosphorus acid derivatives. Thus, heating of hexaethyltri-aminophosphine with β -phenylaminoethanol in a benzene solution gives 2-diethylamino-N-phenyl-1,3,2-oxaazaphospholane. The latter on heating with alcohol readily becomes 2-ethoxy-N-phenyl-1,3,2-oxaazaphospholane.

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UDC: 547.391+547.398.1:118

PUDOVIK, A. N., PUDOVIK, M. A., and TERENT'YEVA, S. A.

"Reaction of Amides of Dialkylphosphorous and Alkylarylphosphinous Acids with alpha, beta-Unsaturated Carboxylic Acids"

Leningrad, Zhurnal Obshchey Khimii, Vol 40, No 1, Jan 70, pp 33-36

Abstract: The mixture of acrylic or methacrylic acid and N,N-diethylethyl-phenylphosphonous amide kept below 90° for one day gave 35 or 38% yields, respectively, of beta-(N,N-diethylcarbamyl)ethyl(isopropyl)-ethylphenylphosphine oxides, liquids identified by their physical constants and IR spectra. Diethylamides of P,P-dialkyl phosphonylpropionic(isobutyric) acids (I) were the main products of the reaction of N,N-diethylamidodialkylphosphite with acrylic or methacrylic acids, respectively. The reaction products contained also a maximum 5% admixture of ethyl P,P-dialkylamidophosphonylpropionate (isobutyrate) (II) which were detected by IR spectra and gas-liquid chromatography. Pure I, where alkyl = ethyl, was obtained in 63% yield by heating at 150° triethyl phosphite with N,N-diethyl-beta-bromopropionamide. Pure II, where alkyl=ethyl, was prepared in 71% yield from N,N-diethylamidodiethylphosphite and ethyl beta-bromopropionate. Physical constants and IR spectrum of pure II differed from those of the amide I, prepared by the reaction of N,N-diethylamidodiethylphosphite with acrylic acid.

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USSR

UDC 547.341'139.81+547.391

PUDOVIK, A. N., BATYYEVA, E. S., SHAGIDULIN, R. R., RAYEVSKIY, O. A.,
PUDOVIK, M. A., Institute of Organic and Physical Chemistry imeni A. Ye.
Arbuzov, Academy of Sciences USSR

"Reaction of Amides of Diphenylphosphinous Acid with α , β -Unsaturated Acids"

Leningrad, Zhurnal Obshchei Khimii, Vol 40, No 6, Jun 70, pp 1195-1202

Abstract: The mechanism of the reaction of diphenylphosphinous acid amides with α , β -unsaturated acids was investigated. Protonation of the nitrogen atom of the amide leads to the formation of an amine and subsequently the amide of the unsaturated acid and diphenylphosphinous acid. Association of the latter leads to the final product, namely β -carbamoyl-alkyl- or alkenyl-diphenylphosphine oxide, depending on whether an α , β -unsaturated acid of the ethylene or acetylene series was used. The proposed mechanism was confirmed by IR spectrometry.

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USSR

UDC 547.393+661.718.1

PUDOVIK, A. N., TERENT'YEVA, S. A., PUDOVIK, M. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR

"Reaction of Complete Phosphites With Amides of α, β -Unsaturated Carboxylic Acids"

Leningrad, Zhurnal Obshchey Khimii, Vol 40, No 8, Aug 70, pp 1707-1711

Abstract: The reaction of tertiary phosphorites with unsubstituted amides of α, β -unsaturated carboxylic acids occurs with participation of the amide group, yielding dialkyl esters of N-alkylcarbamoylalkylphosphonates and carbamoylalkylphosphonates. A mixture of 8.5gm methacrylamide and 16.6gm triethyl phosphite was refluxed for 3 hrs at 140°, yielding 2,3 diethyl-N-ethylcarbamoylisopropylphosphonate, b.p. 143-145/0.05 mm, d_4^{20} 1.0954, n_D^{20} 1.4600. When 14.2gm acrylamide was reacted with 33.2gm triethylphosphite for 2 hrs at 130°, followed by another hour at 150°, a complex mixture of products was obtained, which beside some unreacted material and 1/2

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PUDOVIK, A. N., et al, Zhurnal Obshchey Khimii, Vol 40, No 8, Aug 70, pp 1707-1711

alcohol contained a mixture of diethyl- β -cyanoethylphosphonate and diethyl- β -carbethoxyethylphosphonate, diethyl-N-ethylcarbamoylethylphosphonate, b.p. 135-136°/0.02 mm, d_4^{20} 1.1205, n_D^{20} 1.4590 and solid diethylcarbamoylethylphosphonate, m.p. 76.5-78°. Reacting a mixture of acrylamide, diethylphosphite and triethylphosphite yielded diethyl- β -cyanoethylphosphonate, d_4^{20} 1.1081, n_D^{20} 1.4381 and diethylcarbamoylethylphosphonate m.p. 74-75°.

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1/2 026 UNCLASSIFIED PROCESSING DATE--18SEP70
TITLE--REACTION OF 1,3,2, OXAAZAPHOSPHOLANES WITH ACETIC ANHYDRIDE -U-
AUTHOR--(03)-PUDOVIK, A.N., PUDOVIK, M.A., SHULYNDINA, O.S.
COUNTRY OF INFO--USSR
SOURCE--ZH. OBSHCH. KHIM. 1970, 40(2), 501-2
DATE PUBLISHED-----70
SUBJECT AREAS--CHEMISTRY
TOPIC TAGS--ACETIC ANHYDRIDE, EXOTHERMIC REACTION, HETEROCYCLIC NITROGEN
COMPOUND, ORGANIC PHOSPHORUS COMPOUND, HETEROCYCLIC OXYGEN COMPOUND, IR
SPECTRUM, NMR SPECTRUM
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRA--1985/1406 STEP NO--UR/0079/70/040/002/0501/0502
CIRC ACCESSION NO--AP0101496
UNCLASSIFIED

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UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0101496

ABSTRACT/EXTRACT--(U) GP-O- ABSTRACT. ADDING AC SUB2 O TO I IN C SUB6 H SUB6 (EXOTHERM) (70 TO 80DEGREES MAX.) GAVE AFTER 12 HR 90PERCENT AC NMECH SUB2 CHMEOP(OET)(OAC), B SUBO TIME SUBO01 115 TO 18DEGREES, N PRIME20 SUBO 1.4592, D PRIME20 1.1177. THE PRODUCT ADDED S AND REACTED VIGOROUSLY WITH CCL SUB3 CHO. SIMILAR REACTION OF II WITH AC SUB2 O REQUIRED REFLUXING 1 HR IN C SUB6 H SUB6, TO GIVE ACNPHCH SUB2 CH SUB2 OP (OET)(OAC), WHICH ON ATTEMPTED DISTN. UNDERWENT DISPROPORTIONATION AND GAVE 47PERCENT ACNPHCH SUB2 CH SUB2 OAC, B SUBO TIMES SUBO5 116 TO 17DEGREES, 1.5158, 1.1205. IR AND NMR SPECTRAL DATA WERE GIVEN.

UNCLASSIFIED

AP0049135

Abstracting Service:

CHEMICAL ABST. 5 - 78

Ref. Code:

UR 0079

100829g Reaction of amides of dialkyl phosphorous and alkyl-
aryphosphinous acids with α,β -unsaturated carboxylic acids.
Pudovik, A. N.; Pudovik, M. A.; Terent'eva, S. A. (USSR).
Zh. Obshch. Khim. 1974, 40(1), 33-6 (Russ). Mixing $\text{CH}_2=\text{CH}-$
 CO_2H with Et_2NPtPh at below 90° and holding 1 day gave
35% $\text{EtPhP}(\text{O})\text{CH}_2\text{CH}_2\text{CONEt}_2$, b_{p} 174-7°, d_4^{20} 1.0037, n_D^{20}
1.5337. Similarly was prepd. 38% $\text{EtPhP}(\text{O})\text{CH}_2\text{CHMeCONEt}_2$,
 b_{p} 160-1°, —, 1.5317. Treating 19.3 g $(\text{EtO})_2\text{PNEt}_2$
with 7.2 g $\text{CH}_2=\text{CHCO}_2\text{H}$, maintaining the temp. below 80° gave
 $(\text{EtO})_2\text{P}(\text{O})\text{CH}_2\text{CH}_2\text{CONEt}_2$, contg. some 5% mixed $\text{EtOP}(\text{O})-$
 $(\text{NEt}_2)\text{CH}_2\text{CH}_2\text{CO}_2\text{Et}$, the mixed product, b_{p} 191°, 1.0706,
1.4567; the pure diethylamide, b_{p} 188-90°, 1.0720, 1.4571, was
prepd. in 68% yield from $(\text{EtO})_2\text{P}$ and $\text{Et}_2\text{NCOCH}_2\text{CH}_2\text{Br}$ at
 150° in 2 hr $(\text{PrO})_2\text{PNEt}_2$ (22.1 g) treated with 7.2 g $\text{CH}_2=\text{CH}-$
 CO_2H below 80° gave 29% $(\text{PrO})_2\text{P}(\text{O})\text{CH}_2\text{CH}_2\text{CONEt}_2$, b_{p} 187-
9°, 1.0372, 1.4555. Similarly was prepd. 25% $(\text{PrO})_2\text{P}(\text{O})\text{CH}_2-$
 CHMeCONEt_2 , b_{p} 186-7.5°, 1.0231, 1.4545. Also reported:
 $\text{EtOP}(\text{O})(\text{NEt}_2)\text{CH}_2\text{CH}_2\text{CO}_2\text{Et}$, b_{p} 105-7°, 1.0538, 1.4472;
 $(\text{EtO})_2\text{P}(\text{O})\text{CH}_2\text{CHMeCONEt}_2$, b_{p} 120-1°, 1.0503, 1.4560.
Ir spectra are shown.

G. M. Kosolapoff

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19800941

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UDC 547.26'118

P
PUDOVIK, A. N., PUDOVIK, M. A., and SHULYNDINA, O. S., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of Sciences USSR, Kazan'

"Reaction of 1,3,2-Oxaazaphospholanes With Acetic Anhydride"

Leningrad, Zhurnal Obshchey Khimii, Vol 40, No 2, Feb 70, pp 501-502

Abstract: It is shown that ring substituted and unsubstituted N-alkyl-1,3,2-oxaazaphospholanes react under mild conditions with acetic anhydride resulting in ring cleavage on the nitrogen-phosphorus bond and the formation of corresponding dialkyl acetylphosphites in high yield.

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USSR

UDC 542.91:661.718.1

PUDOVIK, N., YELISEYENKOV, V. N., SERKINA, N. A., and LIPATOVA, I. P.,
Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Academy of
Sciences USSR

"Reactions of Amidophosphites with Alkylmethylphosphonic and Thiophosphonic
Acids"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No 5, 1971,
pp 1039-1044

Abstract: The action of alkylmethylphosphonic and alkylmethylthiophosphonic acids on bis(diethylamido)alkylphosphites and tris(diethylamido)phosphite was investigated. The reactions led to mixed anhydrides of methylphosphonic (thiophosphonic) and amidophosphorous acids. The amount of diethylamine (80-95 percent) formed in these reactions corresponds to the amount of mixed anhydride (70-85 percent) formed, showing the lack of side reactions. The diethylamine formed can react both with the anhydride formed, as well as form a salt with the starting acid, $\text{CH}_3(\text{RO})\text{P}(\text{X})\text{OH} \cdot \text{HNEt}_2$, partially removing it from the reaction. The reactions can occur both in an organic inert solvent, as well as in its absence, and the yield of reaction products is not affected by the order in which the starting reagents (acid to phosphite or vice versa) are

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PUDOVIK, N., et al., Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No 5, 1971, pp 1039-1044

added. To increase the yields of anhydrides, the reagents must be mixed in the cold and after removal of the solvent the reaction mixtures must be heated at 10-50 mm and 60-120° until diethylamine is no longer formed. The mixed anhydrides obtained are saponified with water, forming the diethylammonium salt of phosphorous acid; they add sulfur with evolution of heat, forming pyrophosphonatothiophosphates.

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172 025

UNCLASSIFIED

PROCESSING DATE--18SEP70

TITLE--CONDENSATION AND ADDITION TO UNSATURATED COMPOUNDS OF
TETRAETHOXYDIPHOSPHONOMETHANE -U-

AUTHOR--(03)-PUDOVIK, A.N., YASTREBOVA, G.YE., PUDOVIK, O.A.

COUNTRY OF INFO--USSR

SOURCE--ZH. OBSHCH. KHIM. 1970, 40(2), 499

DATE PUBLISHED-----70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--CONDENSATION REACTION, ORGANIC PHOSPHORUS COMPOUND, ETHYL
ETHER, COMPLEX COMPOUND, ACRYLONITRILE, ACRYLATE, IR SPECTRUM

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1985/1405

STEP NO--UR/0079/70/040/002/0499/0499

CIRC ACCESSION NO--AP0101495

UNCLASSIFIED

2/2 025

UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0101495

ABSTRACT/EXTRACT--(U) GP-O- ABSTRACT. CH SUB2(P(O)(OET SUB2) SUB2 (I) HEATED 8 HR IN C SUB6 H SUB6 IN THE PRESENCE OF SATD. ETOM, ETOH WITH ELECTROPHILIC REAGENTS GAVE THE CORRESPONDING ADDUCTS. WITH CH SUB2:CHCN THE PRODUCT WAS 54PERCENT (NCCH SUB2 CH SUB2) SUB2 C(P(O)(OET) SUB2) SUB2, M. 78-9DEGREES; ME ACRYLATE GAVE ((ETO) SUB2 P(O)) SUB2:CHP(O)(OET) SUB2 GAVE 30PERCENT ((ETO) SUB2 P(O)) SUB2 CHCH SUB2 CH SUB2 P(O)(OET) SUB2, B SUB0.08 183-5DEGREES, 1.1805, 1.4540, WHILE BZH REQUIRED HEATING 22 HR IN XYLENE IN THE PRESENCE OF PIPERIDINE WITH CONTINUOUS REMOVAL OF H SUB2 O AND GAVE 10PERCENT ((ETO) SUB2 P(O)) SUB2 C:CHPH, B SUB0.5 186-8DEGREES, 1.1626, 1.4980. IR SPECTRAL DATA WERE GIVEN.

UNCLASSIFIED

USSR

UDC: 547.26'118

PUDOVIK, A. N., YASTREBOVA, G. YE., and PUDOVIK, O. A., Kazan' State University imeni V. I. Ulyanov Lenin, Kazan', Ministry of Higher and Secondary Specialized Education RSFSR

"Reactions of Tetraethoxydiphosphonmethane Condensation and Addition to Unsaturated Compounds"

Leningrad, Zhurnal Obshchey Khimii, Vol 40, No 2, Feb 70, p 499

Abstract: It is shown that tetraethyl ester of methylenediphosphonic acid in the presence of a saturated alcoholic solution of sodium ethylate adds to the unsaturated electrophilic compounds nitriloacrylic acid, methyl acrylate and diethyl vinylphosphonate. The addition of tetraethoxydiphosphonmethane to nitriloacrylic acid gives bis(2-cyanoethyldiethoxyphosphono)methane. In the case of methyl acrylate and diethyl vinylphosphonate 1-substituted bis(3,3-diethoxyphosphono)propanes are obtained. It was found that the condensation reaction of tetraethoxydiphosphonmethane with benzaldehyde proceeds under considerably more severe conditions than analogous condensation reactions of other organophosphorus compounds containing an active methylene group.

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Acc. Nr.: AP0042379

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Ref. Code: UR0263
JPRS 50162

Anomalous Secular Variation on Kamchatka

(Abstract: "Anomalous Nature of Secular Variation on Kamchatka," by I. M. Pudovkin, A. A. Tanichev, T. A. Shadrina, Ye. E. Blagoveshchenskaya and A. A. Tikhomirov, Leningrad Department, Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation; Moscow, Geomagnetizm i Aeronomiya, Vol X, No 1, 1970, pp 173-175)

This is the second part of this study of secular variation on Kamchatka (for part I, see Geomagnetizm i Aeronomiya, Vol X, No 1, 1970, pp 170-173). Geomagnetic measurements were made in a network of stations in southern Kamchatka separated by an average distance of 10-15 km. Repeated observations were made on the assumption that during the stage of formation of volcanic lavas deep processes can create localized and shallow high-temperature hearths. The magnetic properties of rocks involved in these processes can change relatively rapidly, which should cause changes in the geomagnetic field and thereby give the dynamic magnetic characteristics of deep processes. Observations were made at 24 stations with 2 to 5 observations at each. The results of observations, reduced to the middle of the year, show that the nature of field changes is similar to that observed throughout the regional network. However, the field changes at different

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stations vary. Over a five-year period H changes from -31 to $+41 \gamma$ (the mean error in observing this component is 8γ). During this same period D varies from -9.0 to $6.0'$ (observation error $2.0'$). The structure of the field of anomalies of secular variation Δf_a is extremely complex. The regions of decrease in all magnetic elements are found in a relatively small region (diagrammatic maps of field components accompany the text). The results of observations at stations in the local net were reduced using data for the Yuzhno-Sakhalinsk Observatory and field variation stations. The configuration of the Δf_a isopors for annual periods indicates that the nature of this field changes somewhat from year to year but the sites of the anomalies persist. Judging from the map of structural geology of southern Kamchatka, there is a definite relationship between structural elements and anomalies of secular variation. There is also some relationship between the nature of the Δf_a field and solar activity. Since the secular variation anomalies on Kamchatka correlate with the elements of its structural-tectonic structure and with solar activity, it can be assumed that the causal relationship is of a double nature: 1) a change in the magnetic properties of rocks involved in deep processes and 2) presence of nonuniformity of electrical conductivity of deep layers in the crust and upper mantle.

19760340

USSR

UDC: 681.335.516

~~PUDOVKIN, A.~~ K., Institute of Automation and Electrometry, Siberian Department of the Academy of Sciences of the USSR

"A Device for Modeling and Adding Complex Quantities"

Moscow, Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 26, 1970, Soviet Patent No 279181, Class 42, filed 21 Jan 69, p 135

Abstract: This Author's Certificate introduces: 1. A device for modeling and adding complex quantities. The installation contains a flat base on which coordinate axes are plotted. Fastened at the coordinate origin is an axle covered by a contact sleeve. Inside the sleeve is a linear potentiometer and coaxial with the sleeve is a second semicircular potentiometer. As a distinguishing feature of the patent, the functional possibilities of the device are extended by installing a third semicircular potentiometer and a fourth linear potentiometer on the opposite side of the flat transparent base at the coordinate origin symmetrically with the first and second potentiometers. The upper end of the case of the first potentiometer and the contact sleeve of a fifth linear potentiometer are movably fastened to an auxiliary axle. A sixth semicircular potentiometer is installed coaxial with this auxiliary shaft. 2. A modification of this device distinguished by the fact that three or more complex quantities may be added. The end of the case of the fifth and each subsequent potentiometer is fastened to the next auxiliary axle with the contact sleeve of the (n+1-st) potentiometer and its corresponding semicircular potentiometer.

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UDC 681.335.516

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PUDOVKIN, A. K., Institute of Automation and Electrometry, Siberian
Department of the Academy of Sciences of the USSR

"A Device for Determining the Tangents of Functions"

Moscow, Otkrytiya, Izobreteniya Promyshlennyye Obraztsey, Tovarnyye
Znaki, No 9, 1970, p 134 Patent no 264799, filed 28 Oct 68

Abstract: This Author's Certificate introduces a device for determining the tangents of functions. The unit contains linear potentiometers. As a distinguishing feature of the patent, the functional possibilities of the device are expanded by installing a guide on the base along one axis of the coordinate system. Located in this guide is a slider with a securely fastened semi-circular potentiometer. One contact slide wire of the potentiometer is equipped with a pointer, while the second has two buses, connected to the power supply, and an additional slide wire which makes contact with a linear plastic potentiometer set parallel to the guide and having a middle point superimposed on the other axis of the rectangular coordinate system.

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1/2 022 UNCLASSIFIED PROCESSING DATE--02OCT70
TITLE--DYNAMICS OF THE ZONE OF CORPUSCULAR INJECTIONS -U-

AUTHOR--(03)-ZAYTSEVA, S.A., PUDEVKIN, M.I., SHUMILOV, D.I.

COUNTRY OF INFO--USSR

SOURCE--RAZDEL IV, POLYARNYYE SIYANIYA, 1970, NR 19, PP 42-50

DATE PUBLISHED-----70

SUBJECT AREAS--EARTH SCIENCES AND OCEANOGRAPHY, ASTRONOMY, ASTROPHYSICS,
ATMOSPHERIC SCIENCES

TOPIC TAGS--GEOMAGNETIC STORM, POLAR AREA, SOLAR CORPUSCULAR RADIATION,
SOLAR WIND, MAGNETOSPHERE, AURORA

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRA--1994/0118

STEP NO--08/3337/70/000/019/0042/0050

CIRC ACCESSION NO--AP0114514

UNCLASSIFIED

2/2 022

UNCLASSIFIED

PROCESSING DATE--02OCT70

CIRC ACCESSION NO--AP0114514

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE PAPER ANALYSES CERTAIN PHENOMENA OF THE POLAR MAGNETIC STORM AND DESCRIBES THE CHARACTERISTIC FEATURES OF ITS DEVELOPMENT. AT THE START OF THE DISTURBANCE THE ARCS ARE DISPLACED TO THE EQUATOR. FURTHER EXPANSION OF THE AURORA BELT IS ACCOMPANIED BY A CONSIDERABLE SHIFT OF THE SOUTHERN BOUNDARY OF THE BELT TO THE EQUATOR. THE LONGITUDINAL DRIFT TO THE REGION OF INJECTION OF CORPUSCULAR STREAMS IS STUDIED ON THE BASIS OF THE DATA ON BAY LIKE DISTURBANCES AND OF THE DATA ON AURORAE ABSORPTION. THE REGION OF INJECTION OF THE PROTONS DRIFTS FROM THE MIDNIGHT MERIDIAN TO THE WEST AND THE TOTAL REVOLUTION AROUND THE EARTH IS APPROXIMATELY ONE HOUR. THE INJECTION REGION OF THE ELECTRONS DRIFTS FROM THE WEST TO THE EAST. THE MEAN ENERGY OF ELECTRONS TAKING PART IN SUCH GRADIENT DRIFT IS ABOUT 100 KEV. THE PAPER STUDIES THE TIME CONNECTION BETWEEN THE BAYS IN THE AURORAE ZONE AND THE MAGNETIC POLE VARIATIONS ON THE EQUATOR. 1-2 HOURS BEFORE THE MAXIMUM OF THE BAY IN THE AURORAE ZONE A SLIGHT INCREASE OF THE H COMPONENT IS OBSERVED ON THE EQUATOR. THE OBTAINED DEPENDENCE IS INTERPRETED AS THE RESULT OF THE INCREASE OF SOLAR WIND PRESSURE ON THE MAGNETOSPHERE.

UNCLASSIFIED

1/2 019
UNCLASSIFIED
TITLE--STRONTIUM 90 FALLOUT DISTRIBUTION AT MIDDLE LATITUDES OF THE
NORTHERN AND SOUTHERN HEMISPHERES AND ITS RELATION TO PRECIPITATION -U-
AUTHOR--(02)--MALAKHOV, S.G., PUDOVKINA, I.B.
COUNTRY OF INFO--USSR
SOURCE--J. GEOPHYS. RES. 1970, 75(18), 3623-8
DATE PUBLISHED-----70
SUBJECT AREAS--NUCLEAR SCIENCE AND TECHNOLOGY, ATMOSPHERIC SCIENCES
TOPIC TAGS--STRONTIUM ISOTOPE, RADIOACTIVE FALLOUT, ATMOSPHERIC
PRECIPITATION
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRA--3007/0465
CIRC ACCESSION NO--AP0135928
STEP NO--US/0000/70/075/018/3623/3628
UNCLASSIFIED

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UNCLASSIFIED

PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0135928

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE DEPENDENCE OF PRIME90 SR DEPOSITION ON PPTN. WITHIN EACH 10DEGREES LATITUDE BELT WAS INVESTIGATED. NO SATISFACTORY LINEAR CORRELATIO IS FOUND FOR UNDIFFERENTIATED MEASUREMENTS OBTAINED UNDER DIFFERENT CLIMATIC CONDITIONS. REGIONS IN WHICH THE DATA DEVIATE SYSTEMATICALLY FROM THE GENERAL TREND OF RESULTS IN EACH LATITUDE BELT ARE SINGLED OUT. A SATISFACTORY LINEAR CORRELATION FOR MOST OF THE DATA HAS BEEN OBTAINED FOR 4 SEASONS OF THE YEAR BETWEEN 50 AND 60DEGREESN AND FOR THE 1ST AND 2ND QUARTERS BETWEEN 30 AND 40DEGREESN AND 40 AND 50DEGREESN. IN THE LATTER CASES, THE 3RD QUARTER IS CHARACTERIZED BY THE LARGEST DEVIATIONS OF THE RESULTS FROM A LINEAR DEPENDENCE. THE REGRESSION EQUATIONS FOR THE DEPENDENCE OF PRIME90 SR DEPOSITION ON PPTN. IN EACH LATITUDE BELT ARE GIVEN. FACILITY: HYDROMETEOROL. SERV., INST. EXPTL. METEOROL., OBNINSK, USSR.

UNCLASSIFIED

USSR

UDC 681.332.64

MAKAREVICH, O. B., BAYEV, B. M., ~~PUDZENKOV, N. A.~~, and P'YAVCHENKO, O. N.,
Taganrog Radio Engineering Institute

"A Computing Device"

Moscow, Otkrytiya, izobreteniya, promyshlennyye obraztsy, tovarnyye znaki,
No 3, Jan 71, Author's Certificate No 291216, Division G, filed 7 Apr 69,
published 6 Jan 71, pp 123-124

Translation: This Author's Certificate introduces a computing device for a digital integrator. The device contains a memory device, integration modules, a multiplier, adders, a remainder register, rectifiers, and shapers. As a distinguishing feature of the patent, the device is simplified and speed is increased by connecting the outputs of the memory device to the inputs of the multipliers and parallel integration modules. Some outputs of the integration modules are connected to inputs of the memory device, while the other outputs of these modules are connected to the inputs of the multipliers. The outputs of the multipliers are connected to the inputs of the non-quantum increment adder, and the output of this adder is connected to the inputs of the increment shaper and a rectifier. The second inputs of the shaper and rectifier are connected to the outputs of the control device. The output of the rectifier is connected to the input of the remainder register, and

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MAKAREVICH, O. B., et al., Otkrytiya, izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, No 3, Jan 71, Author's Certificate No 291216, Division G, filed 7 Apr 69, published 6 Jan 71, pp 123-124

the other input of the register is connected to the output of the memory device. The output of the remainder register is connected to the second input of the adder which combines the partial sum with the sum of the non-quantum increments.

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USSR

UDC:681.3.06:51

PUDZENKOV, N. A.

"The Principle of Scaleless Programming for Digital Integrators"

Tsifrov. Modeli i Integriruyushch Struktury [Digital Models and Integrating Structures -- Collection of Works], Taganrog, 1970, pp. 148-156
(Translated from Referativnyy Zhurnal Matematika, No. 11, 1970, Abstract No. 11V516, Unsigned)

Abstract: The process of solution of problems on digital integrators is divided into three stages: programming, test solutions, and final solution with processing of results. The test solution stage is necessary to determine the correctness of selection of scaling factors and initial values in order to prevent overfilling of the word format during solution and to obtain maximum accuracy of the solution. In many cases, the test solution stage is considerably more cumbersome than the stages of programming and final solution put together.

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UDC:681.3.06:51

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PUDZENKOV, N. A., Tsifrov. Modeli i Integriruyushch Struktury [Digital Models and Integrating Structures -- Collection of Works], Taganrog, 1970, pp. 148-156 (Translated from Referativnyy Zhurnal Matematika, No. 11, 1970, Abstract No. 11V516, Unsigned)

This work presents an attempt to develop a method of "scaleless programming," allowing all variables with unknown limits of change to be represented in a predetermined scale. This method allows the stage of test solution to be eliminated and greatly increases the productivity of the digital integrator.

USSR

UDC 669.094, 3:621.295

VOYTOVICH, R. F., and PUGACH, E. A., Institute of Problems of Material Science, Academy of Sciences Ukrainian SSR

"High-Temperature Oxidation of Titanium Carbide"

Kiev, Poroshkovaya metallurgiya, No 2, Feb 72, pp 63-68

Abstract: This study concerns the high-temperature oxidation of TiC in open air within 500-1200°C for 5 hrs. In the TiC interaction with oxygen, the most preferred reaction appears to be that of the formation of corresponding oxides and carbon accumulated under the layer of the scale. The thermodynamic calculation of equilibria in TiC-O(N) systems within 298-2000°K indicates Ti to be unstable in O and N media up to 1800°C. In the process of TiC oxidation carbon appears to promote the sintering of scale and stabilization of oxide phases. The metallography and x-ray diffraction analysis of the TiC sinter scale indicates the presence of metallic titanium which supports the complex model of the faulty structure of the oxides suggesting predominant diffusion of interstitial cations at high temperatures. (3 illustrations, 1 table, 20 bibliographic references).

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172 009 UNCLASSIFIED PROCESSING DATE--20NOV70
TITLE--BROWN COALS FROM THE KHOLBOL'DZHINSKII PART OF THE GUSENOOZERSK
DEPOSIT AS FUEL FOR LARGE SCALE POWER PLANTS -U-
AUTHOR--(04)--SHARLOVSKAYA, M.S., PUGACH, L.I., KOLBASOV, YE.V., SKERKO,
N.N.
COUNTRY OF INFO--USSR
SOURCE--TEPLCENERGETIKA 1970, 17(5), 45-7
DATE PUBLISHED-----70
SUBJECT AREAS--EARTH SCIENCES AND OCEANOGRAPHY
TOPIC TAGS--COAL, ELECTRIC POWER PLANT
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRA--3005/0389 STEP NO--UR/0096/70/017/005/0045/0047
CIRC ACCESSION NO--AP0132618
UNCLASSIFIED

272 CC9

UNCLASSIFIED

PROCESSING DATE--20NOV70

CIRC ACCESSION NO--AP0132618

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE COMBUSTIBLE MASS CONTAINED 69-73PERCENT C, 4.5-5.1PERCENT H, AND 38-43PERCENT VOLATILE MATTER. SOME COALS HAD 4.5 PERCENT S (DRY BASIS), CONSISTING OF 72-90PERCENT ORG. AND PYRITE S. THE ASH CONTENT WAS 9-30PERCENT. THE ASH CONTAINED 30-70PERCENT SIO SUB2, 11-24PERCENT AL SUB2 O SUB3, 1.7-16PERCENT CAO, 3-27PERCENT FE SUB2 O SUB3, 0.35-3PERCENT NA SUB2 O K SUB2 O, AND 0.77-16PERCENT SO SUB3. WITH DECREASING ASH CONTENT, THE AMT. OF CAO AND SO SUB3 IN THE ASH INCREASED. THE ASH WAS LOW MELTING.

UNCLASSIFIED

USSR

UDC: 517.946

PUGACH, N. I.

"Solving the First and Second Cauchy-Goursat Problems for An Equation of the Hyperbolic Type"

V sb. Materialy Itos. nauchn. konferentsii. Kuybyshev. gos. ped. in-t, 1970. Vyssh. matematika (Results of the Scientific Conference, Kuybyshev State Pedagogical Institute, 1970, Higher Mathematics) Kuybyshev, 1970, pp 44-46 (from RZh-Matematika, No. 3, March 71, Abstract No. 3B246)

Translation: The problem

$$z_{xy} + \frac{1+q}{x-y} z_x + \frac{1-q}{x-y} z_y = 0$$

$$z|_{x=0} = \psi(y), \quad z|_{y=x} = \tau(x),$$

is considered (in its classical form) in the region with boundaries $x = 0$, $y = 1$, $y = x$. The solution is found in explicit form.
N. Flaysher

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USSR

UDC 536.22

PUGACH, V. V. (Grozny Petroleum Institute)

"Experimental Investigation of Toluene Heat Conductivity at High Pressures"

Minsk, Inzhenerno-Fizicheskiy Zhurnal, Vol 19, No 4, Oct 70, p 755

Abstract: The results of an experimental investigation of toluene heat conductivity in the 20-180°C temperature range and at 150 MN/m² are presented. Toluene heat conductivity was measured on a specially designed apparatus, with a measuring cell realized according to the method of coaxial cylinders.

Scintillation type toluene ($\rho_{\text{t}}^{20} = 0.8669$; $n_{\text{D}}^{20} = 1.4969$) was selected for investigation. Measurement were conducted along the isotherms per $\sim 20-30$ MN/m². The maximum relative error in measurement is about 1.6% at not more than 0.6% scattering of experimental data, with respect to the average curves. The obtained results are presented in a graph. Their analysis shows that the toluene heat conductivity decreases with increasing temperature and increases with pressure. Isobars are slightly curved toward the temperature axis, while isotherms, from the pressure axis. The obtained experimental data are well described by an interpolation equation presented here. The divergence between
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USSR

PUGACH, V. V., Inzhenerno-Fizicheskiy Zhurnal, Vol 19, No 4, Oct 70, p. 755
the experimental and calculated data does not exceed the inaccuracies of the
experiment. 8 references.

2/2

1/2 021
TITLE--EXPERIMENTAL STUDY OF THE THERMAL CONDUCTIVITY OF WATER AT HIGH
PRESSURES -U-
AUTHOR-(02)-RASTORGUYEV, YU.L., PUGACH, V.V.

PROCESSING DATE--20NOV70

COUNTRY OF INFO--USSR

SOURCE--TEPLOENERGETIKA 1970, 17(4), 77-9

DATE PUBLISHED-----70

SUBJECT AREAS--PHYSICS

TOPIC TAGS--THERMAL CONDUCTIVITY, WATER, HIGH PRESSURE EFFECT

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1998/0555

STEP NO--UR/0096/70/017/004/0077/0079

CIRC ACCESSION NO--AP0121227

UNCLASSIFIED

2/2 021

UNCLASSIFIED

PROCESSING DATE--20NOV70

CIRC ACCESSION NO--AP0121227

ABSTRACT/EXTRACT--(J) GP-O- ABSTRACT. THE THERMAL COND. OF WATER WAS STUDIED AT 20-180 DEGREES AND PRESSURES OF 0.101-196 MN-M PRIME2. A SPECIAL APP. WAS USED THE MEASURING CELL OF WHICH CONSISTS OF COAXIAL CYLINDERS WITH PLANE ENDS. THE MAX. RELATIVE ERROR OF MEASUREMENT WAS PLUS OR MINUS 1.6 PERCENT, THE SCATTER OF THE EXPTL. POINTS FROM THE MEDIUM VALUES 0.6 PERCENT. THE EXPTL. DATA ON THE LINE OF SATN. AGREE WELL WITH LITERATURE DATA. THE ISOBARS OF THERMAL COND. PASS THROUGH A MAX. WITH INCREASING PRESSURE THE MAX. OF THERMAL COND. IS SHIFTED TO THE SIDE OF HIGHER TEMP. WITH INCREASING PRESSURE THE MOL. COMPLEXES BECOME MORE STABLE AND ARE DESTROYED ONLY AT HIGHER TEMPS. THE EFFECT OF PRESSURE ON THERMAL COND. INCREASES WITH TEMP. WITH INCREASING D. THE THERMAL COND. OF WATER ON THE ISOBARS 1ST INCREASES, THEN PASSES THROUGH A MAX. THIS MAX. IS SHIFTED WITH INCREASING PRESSURE TO THE SIDE OF INCREASING D., THEN IT DROPS SHARPLY. ON THE ISOTHERMS THE THERMAL COND. INCREASES WITH THE D. FACILITY: GROZN. NEFT. INST., GROZNY, USSR.

UNCLASSIFIED

USSR

UDC: 551.596:534.143

SHEV'YEV, Yu. P., MATSEVICH, E. V., PUGACHEV, A. D.

"Using the Method of Electroacoustic Analogies in Measuring the Acoustic Transparency of Material Specimens"

Tr. Taganrog. radiotekhn. in-ta (Works of Taganrog Radio Engineering Institute), 1973, vyp. 34, pp 180-184 (from RZh-Fizika, No 5, May 73, abstract No 5Zh631 by Ye. B. Kudashev)

Translation: A new method is proposed for measuring the coefficient of acoustic transparency of material specimens and structural elements in water on an installation of the "shock tube" type. The direct system of electroacoustic analogies is considered, enabling representation of the specimen as a two-terminal pair network. It is shown that the voltage ratio at the input and output of the network determines the acoustic transparency of a specimen characterized in the logarithmic scale by the difference in levels of the acoustic pressure measured in a hydroacoustic tube behind and in front of the specimen. A relation is derived for calculating the coefficient of acoustic transparency from the input impedances of the investigated specimen in the open-circuit and short-circuit modes. The

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USSR

SHEV'YEV, Yu. P. et al., Tr. Taganrog. radiotekhn. in-ta, 1973, vyp. 34, pp 180-184

paper gives the results of measurement of the variation, with frequency, of acoustic transparency of metal plates 1.4 and 0.4 cm thick. Some discrepancy between the experimental and theoretical results is attributed to the error in phase measurements. It is shown that the experimentally determined values of input impedances may also be used for calculating the modulus of normal elasticity and the density of experimental specimens of new sound-absorbing materials. The proposed method holds promise for studying the acoustic transparency of materials and structural elements at high hydrostatic pressures.

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USSR

UDC 621.791.763.1:669.821.5

RYAZANTSEV, V. I., and PUGACHEV, A. I., Candidates of Technical Sciences,
All-Union Scientific Research Institute of Aviation Materials

"Contact Spot Welding of Deformable Magnesium Alloys"

Moscow, Svarochnoye Proizvodstvo, No 2, Feb 74, pp 16-19

Abstract: The weldability of seven magnesium alloys using contact spot welding was determined with the mechanical properties and corrosion resistance of the weld joints also determined. The alloys tested were: VMD3, VMD5, VMD6, VMD7, VMD8, MA12, and INV2. Spot welds were made using the same two alloys welded together and combinations of two alloys: VMD8+VMD6, VMD8+VMD7, VMD8+VMD3, VMD8+MA12, VMD3+VMD6, and VMD3+MA12. It was found that all the alloys can be satisfactorily spot welded and "hard" and "soft" current pulses can be used for all the alloys except INV2. The mechanical properties of the weld joints under static tests of alloys VMD5, VMD8, MA12, and INV2 were at the level of the properties of alloy AMg3 but 25-30% lower than for alloy D16T and O1420. The properties of VMD6 and VMD7 were on par with alloy D16T. Cyclic loading to fracture at a load equal to 0.5 of the shear strength was 2700-3300 cycles for all alloys, which was 6-8 times less than that
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USSR

RYAZANTSEV, V. I., and PUGACHEV, A. I., Svarochnoye Proizvodstvo, No 2, Feb 74, pp 16-19

for D16T. The fatigue strength of VMD3, VMD6, and MA12 was 2-3 times less, and VMD5 and VMD8, 1.1-1.4 times less than for D16T. A primer coating of AK-070 and enamel EP140 provided unsatisfactory corrosion resistance. The best corrosion protection was afforded by a lacquer-paint coating of AK-070+EP140 (three layers) + composition No 2 on an S-38 base (2 layers). Four tables.

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Welding

USSR

RYAZANTSEV, V. I., ~~RYAZANTSEV, A. I.~~, Candidates of Technical Sciences, UDC 621.791.042:669.15'74-194
SMIRNOVA, Ye. I., MINHEYEV, I. M., Engineers, ANTONOV, Ye. G., Candidate of
Technical Sciences, and OSOKINA, T. N., Engineer

"Selection of an Additive Material for Welding of Mg-Zn-Zr-REM Alloys"

Moscow, Svarochnoye Proizvodstvo, No 7, Jul 1972, pp 9-11

Abstract: Deformable magnesium alloys in the system Mg-Zn-Zr-REM are recommended for the manufacture of complex structures without stress relief following welding. These alloys have tensile strengths of at least 22 kg/mm² and $\delta \geq 15\%$. These alloys are also superior in impact toughness, relative elongation, and relative reduction in area. The weldability of the alloys studied was evaluated using sheets 2 mm thick following annealing for one hour at 260°C. The alloys were found to have good weldability with argon arc welding using wires with compositions differing from the base metal. Two compositions of wires based on Mg are suggested: 1.0-1.5% Zn, 0.5-0.7% Zr, 2.8-3.7% Ce, and 1.0-1.5% Zn, 4.4-7.0% Al, 0.3-0.6% Mn. The former wire is recommended for complex and rigid structures with large volumes of manual welding; the latter is recommended for automatic welding of structures to be subjected to impact and cyclical loading. These wires produce welded joints with strengths at least 90% of the base metal, bending angle at least 1/2

USSR

RYAZANTSEV, V. I., et al., Svarochnoye Proizvodstvo, No 7, Jul 1972, pp 9-11

50 and 65° respectively. Overall corrosion of welded seams using these wires is similar to the base metal; the welded joints are not inclined to corrosion under stress.

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USSR

RYAZANTSEV, V. I., PUGACHEV, A. I., SMIRNOVA, Ye. I., BLYABLIN, A. A.,
KUDISHINA, T. A., OSOKINA, T. N., Moscow, Svarochnoye Proizvodstvo
No 10, Oct 72, pp 8-10.

For welding wire in the Mg-Zn-Zr-Ce system, an increase in Ce content to 3.7% or more causes a sharp increase in diffusion penetration of this element from the seam into the surrounding zone, significantly increasing resistance to the formation of hot cracks ($A \geq 0.6$ mm/min).

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APPROVED FOR RELEASE: 09/17/2001

CIA-RDP86-00513R002202610007

UDC 621.791.052.678.017.1.74

USSR

RYAZANTSEV, V. I., ~~PUGACHEV, A. I.~~, SMIRNOVA, Ye. I., BLYABLIN, A. A.,
KUDISHINA, T. A., and OSOKINA, T. N.

"Chemical Microheterogeneity of Welded Joints of VMD8 Magnesium Alloy"
Moscow, Svarochnoye Proizvodstvo, No 10, Oct 72, pp 8-10.

Abstract: The mechanism of formation of microchemical heterogeneity of VMD8 alloy welded joints through the cross section is studied as a function of the chemical composition of the welding wire. It is shown that the degree of microchemical heterogeneity and the nature of its placement have a decisive influence on the hot shortness of the joint metal. Microchemical heterogeneity in the fusion zone and in the near-seam zone arises as a result of diffusion redistribution of elements from the seam into the surrounding zone (Ce for 5-8 wire) and from the surrounding zone into the seam (Zn for type 5-7 wire), as well as diffusion enrichment of melted boundaries with such elements. It is established that when welding is performed with wires in the system Mg-Al-Zn-Mn, the distribution of alloying elements in the fusion zone is such that no change in the composition of the wire can cause a reduction in hot shortness ($A = 0.3$ mm/min).

Heat Treatment

USSR

UDC 669.293.5'296'786.018.44:621.785.783

ZVEZDIN, YU. I., POVYSHEV, I. A., PUGACHEV, G. S., YAKOVLEV, V. A.

"Effect of Heat Treatment on the Mechanical Properties of Nb-Zr-N and Nb-Zr-C Alloys"

Metallovedeniye -- V sb. (Physical Metallurgy -- collection of works), No 14, Leningrad, Sudostroyeniye Press, 1970, pp 233-237 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4I784)

Translation: A study was made of the problems of heat treatment of dispersion-hardening alloys of the Nb-Zr-N and Nb-Zr-C systems. It was demonstrated that hardening of the alloys is achieved by separation of the interstitial phases in the aging process at 1,000-1,100°. The alloys have maximum strength after special heat treatment consisting in annealing at 1,300° with subsequent aging in the 1,000-1,100° range. There are 4 illustrations, 2 tables, and a 2-entry bibliography.

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USSR

UDC 620.172.251.224

YEFTIKHIN, V. A., ZVEZDIN, Yu. I., KAPRIZOV, V. A., and PUGACHEV, G. S.

"Device for Creep and Fatigue Strength Tests of Metals at High Temperatures in a Vacuum of the Order of 10^{-9} mm Hg"

Moscow, Zavodskaya Laboratoriya, No 2, 1971, pp 228-230

Abstract: A device for creep and fatigue strength tests of metals at high temperatures in a vacuum of the order of 10^{-9} mm Hg is described. Its main components - vacuum system, electro-supply and control systems, charging device, heater, and deformation measuring system - are discussed in detail by reference to a diagram. Results of fatigue strength tests of some niobium alloys in a vacuum of 10^{-7} — 10^{-9} mm Hg are demonstrated and compared with tests conducted on the PB-3012 unit producing a vacuum of 10^{-6} mm Hg. It is concluded that a vacuum of at least 1×10^{-8} mm Hg which is free of oil vapors must be used to obtain the correct strength characteristics of the investigated metals.

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AA0040629

P

Pugachev, M. G. UR 0482

Soviet Inventions Illustrated, Section I Chemical, Derwent,

3-70

235699 CULTIVATION OF MICROORGANISMS such as yeasts in a medium containing dispersed solid paraffins as a carbon source is improved by increasing the degree of dispersion of the paraffins. This is achieved by preparing a 1% suspension of solid paraffin in water; melting the dispersed paraffin by heating the suspension to 55-60°C; pumping the suspension into an atomiser under a pressure of 8-12 atm. gauge, where the suspension is divided into a number of streams is directed that they collide producing ultrasonic vibrations. By this method, the size of the paraffin particles is reduced to 5 μ in average. 28.7.67. as 1175954/28-13, GORYAEV, M.I. et al. Chemical Sciences Inst. Acad. Sciences Kazakii, SSR. (16.6.69) Bul. 6/24.1.69. Class 6a, Int. Cl. C 12k.

1/2

LD 6

19750187

AA0040629

AUTHORS: Goryayev, M. I.; Tret'yakov, L. I.; Pugachev, M. G.;
and Tsay, E. A.

Institut Khimicheskikh Nauk AN Kazakhskoy SSR

19750188

USSR

UDC: 51

PUGACHEV, V. F., MARTYNOV, G. V., MEDNITSKIY, V. G., PITELIN, A. K.

"Multistage Optimization With Specific Forms of Local Criterion"

Ekonomika i mat. metody, 1973, 9, No 2, pp 204-217 (from RZh-Kibernetika, No 7, Jul 73, abstract No 7V534 [authors' introduction])

Translation: In RZhMat, 1973, 1V737 a scheme of multistage optimization with local criterion of general form is considered. Using specific forms W, corresponding modifications of the general scheme can be made, computational experiments can be formulated, a comparative analysis can be made, and conclusions of a mathematical and economic nature can be drawn. The paper deals with just this class of problems.

1/1

USSR

UDC 62-50

PUGACHEV, V. S., Corresponding Member of the Academy of Sciences USSR, Institute of Problems in Control (Automation and Telemechanics), Moscow

"Normal Stochastic Systems"

Moscow, Doklady Akademii Nauk SSSR, Vol 208, No 3, 1973, pp 566-569

Abstract: Simplified approximation methods for the study of stochastic systems are of great value for the study of complex systems with nondeterministic behavior. Such methods can be developed on the basis of a study of a class of normal stochastic systems which represents the stochastic analog of a class of linear deterministic systems. The article shows that any normal system can be regarded as the series connection of a chain consisting of a deterministic linear system with operator L and a noise generator which produces the normally distributed noise Y' , which does not depend on the input signal, and an ideal deterministic adder, all of these being parallel-connected. Theorems are formulated which, in conjunction with the formulas for the decision functions of stochastic system connections previously derived by the author, show that any connections of normal systems are normal systems.

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PUGACHEV, V. S., Doklady Akademii Nauk SSSR, Vol 208, No 3, 1973, pp 566-569

The results make it possible to use the apparatus of linear system theory for a statistical analysis of normal systems. The only thing to be considered here, aside from the usual parasitic and noise sources in deterministic systems, is the internal noise in a normal stochastic system created by noise generators connected to deterministic linear systems in the elements of this system. This immeasurably simplifies the study and, in particular, the modeling of normal stochastic systems as compared to the study of stochastic systems which are nonnormal.

A general method for solving the problem of the normalization of a stochastic system is described.

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USSR

FUGACHEV, V. S.

"The Distribution of the Number of Excesses of a Random Process"

Moscow, Nelineynyye i Optimal'nyye Sistemy, 1971, pp 374-381

Abstract: A random quantity, equal to the number of excesses of a random process beyond a fixed level during a fixed interval of time, is studied. The distribution of this quantity is approximated by part of an expansion of orthogonal polynomials, related to the Poisson rule. Approximation formulas are derived for the moments of the distribution, plus approximating expressions for the probabilities of various values of the number of excesses.

2/1

USSR

UDC 519.9

PUGACHEV, V. S., Corresponding Member USSR Academy of Sciences, Institute of Problems of Control (Automation and Telemechanics)

"Differential Equations for the Probabilities of States of a System"

Moscow, Doklady Akademii Nauk SSSR, Vol 198, No 1, 1 May 71, pp 44-45

Abstract: In queueing theory and in the dynamics of averages Kolmogorov's differential equations are ordinarily used for the probabilities of states of a system with a finite or denumerable set of possible states, wherein it is assumed that the process of change in the state of a system is a Markovian random process (a process without aftereffect) and therefore all transitions from one process to another must be Poissonian in nature. However, it is also true that Kolmogorov's differential equations for the probabilities of states of a system are valid not only for Markovian random processes but also for a wide class of processes with aftereffect. This article proves this statement through the use of four equations and discussion thereof.

The author discusses the probability of rejection in the case of a Poissonian process but states that the non-Poissonian process as concerns rejection probability must be solved in some other manner than that discussed in the present article.

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USSR

PUGACHEV, V. S., Doklady Akademii Nauk SSSR, Vol 198, No 1, 1 May 71,
pp 44-45

At the moment of time when the respective δ -function has singularity the probability of the state in which the system was located before this suddenly jumps to zero and the probability of the state into which the system changes becomes equal to unity. The condition for the existence of the limits in equation (2) as generalized functions is obviously necessary for equation (3) to describe the change in probability of states of the system.

This article contains four equations and a bibliography of seven titles.

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USSR

UDC 62-50

PUGACHEV, V. S., Corresponding Member of the USSR Academy of Sciences

"Stochastic Systems and Combinations of Them"

Moscow, Doklady Akademii Nauk SSSR, Vol 197, No 6, 1971, pp 1288-1290

Abstract: The basic types of combinations of systems in automatic control theory are parallel combination, series combination, and closure by feedback. These concepts are extended in this article to stochastic systems by generalizing them correspondingly. All possible combinations of systems are obviously combinations of the three basic types of combinations investigated. Three propositions are stated which establish the completeness of the class of stochastic systems with respect to all possible combinations and define the relations among the decision functions of the combinations and the decision functions of the combined systems. These propositions offer the theoretical possibility of finding the characteristics of any combinations of stochastic systems by the given characteristics of the combined systems.

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USSR

UDC 519.21

PUGACHEV, V. S.

"Distribution of the Number of Rejecting of a Random Process"

Nelineyn. i optimal'n sistemy - Sbornik (Nonlinear and Optimal Systems - Collection of Works), Moscow, "Nauka," 1971, pp 374-381 (from Referativnyy Zhurnal - Matematika, No 8, Aug 71, Abstract No 8V140)

Translation: A random value equal to the number of rejections of a random process beyond the given level for a given time interval is considered. The distribution of this quantity is approximated by a segment of the expansion in orthogonal polynomials associated with Poisson's law. Approximation formulas are obtained for the moments of distribution, along with approximate expressions for the probabilities of different values of the number of rejections. (Author's abstract)

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USSR

UDC 911.3.616.981.455(574)

KONDRASHKIN, G. A., ~~PUGACHEV, Yu. A.~~, KONDRASHKINA, K. I., KALYAZINA, I. M.,
PROSHIN, V. G., LUK'YANOVA, A. D., KORCHEVSKAYA, V. A., KORCHEVSKIY, P. G.,
and POLYAKOV, V. K.

"Landscape-Epidemiological Regional Division Into Tularemia Districts in the
Trans-Ural Area of Western Kazakhstan"

V sb. Probl. osobo opasn. infektsiy (Problems of Especially Dangerous In-
fections -- collection of works) Byp. 5(15), Saratov, 1970, pp 91-105 (from
RZh-Meditsinskaya Geografiya, No 4, Apr 71, Abstract No 4.36.96)

Translation: The Trans-Ural area of Western Kazakhstan consists of four land-
scape-epidemiological areas: the Barbastau-Ileko-Utvinskiy area (steppe),
the Chelkaro-Ankatinskiy area (dry steppe), the Chiderty-Ulenty-Buldurtinskiy
area (semi-desert), and the Kaldygayty-Uil'skiy area (semi-desert-desert).
Each area is described. Characteristic for the steppe and dry steppe areas
is the steppe type of tularemia focus; while the estuary semi-desert type
of tularemia focus is typical for the semi-desert. The prolonged epizootic
"calm" of tularemia foci in the Trans-Ural area is due to the progressive
drying out of once extensive local river delta floods. Because of cattle
slaughter, xerophyt plants take over with river land turning to desert.

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USSR

KONDRASHKIN, G. A., et al., Probl. osobo opasn. infektsiy (Problems of Especially Dangerous Infections -- collection of works) Vyp. 5 (15), Saratov, 1970, pp 91-105 (from RZh-Meditsinskaya Geografiya, No 4, Apr 71, Abstract No 4.36.96)

The projected irrigation of the Trans-Ural area by construction of the Volga-Ural canal may activate local native tularemia foci. Numerical tables are provided for small mammals and their ectoparasites in the areas defined.

2/2

1/2 020 UNCLASSIFIED PROCESSING DATE--20NOV70
TITLE--LACTIC DEHYDROGENASE ISOENZYMES IN THE URINE OF CHILDREN WITH
CHRONIC PYELONEPHRITIS -U-
AUTHOR-(02)-PUGACHEVA, V.I., YURKOV, YU.A.
COUNTRY OF INFO--USSR
SOURCE--PEDIATRIYA 49(2): 44-46, 1970
DATE PUBLISHED-----70
SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES
TOPIC TAGS--LACTATE DEHYDROGENASE, ISOZYME, URINE, PEDIATRICS,
NEPHRITIS, DIAGNOSTIC METHODS
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAPE--3007/0341 STEP NO--UR/0546/70/049/002/0044/0048
CIRC ACCESSION NO--AP0135834
UNCLASSIFIED

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UNCLASSIFIED

PROCESSING DATE--20NOV70

CIRC ACCESSION NO--AP0135834

ABSTRACT/EXTRACT--(U) GP-C- ABSTRACT. THE TECHNIQUE OF DETERMINING TOTAL ACTIVITY AND ISOENZYMES OF LACTIC DEHYDROGENASE IN THE URINE IS DESCRIBED. BASING ON THE INVESTIGATION OF THIS ENZYME IN 38 HEALTHY CHILDREN (FROM 3 TO 14 YEARS OLD) THE STANDARDS OF THE TOTAL ACTIVITY AND ISOENZYMES IN THE URINE WERE ELABORATED, AND IN 62 PATIENTS WITH CHRONIC PYELONEPHRITIS THE DIAGNOSTIC VALUE OF THE ENZYME WAS STUDIED. WITH EXACERBATION OF CHRONIC PYELONEPHRITIS ALL 5 FRACTIONS OF LACTIC DEHYDROGENASE CAN BE DETERMINED. IN SEVERE BILATERAL AFFECTON MARKED PREVALENCE OF CATHODE FRACTIONS WAS OBSERVED. DURING REMISSION THE SPECTRUM OF ISOENZYMES AND TOTAL ACTIVITY APPROACHED THAT OF NORMAL URINE. IN PATIENTS WITH GLOMERULAR AFFECTON OF THE KIDNEYS THE SPECTRUM OF ISOENZYMES IS CHARACTERIZED BY A MARKED PREVALENCE OF ANODE FRACTIONS. FACILITY: DEP. CHILD DIS., MOSCOW, MED. STOMATOL. INST., MOSCOW, USSR.

UNCLASSIFIED

1/2 026 UNCLASSIFIED PROCESSING DATE--11SEP70
TITLE--ANALYSIS OF THE GORSKY BRAGG WILLIAMS MODEL -U-
AUTHOR--PASKAL, YU.I., PUGACHEVAVALOVSKAYA, L.I.
COUNTRY OF INFO--USSR
SOURCE--UKR. FIZ. ZH. (RUSS. ED.) 1970, 15(1), 143-5
DATE PUBLISHED-----70
SUBJECT AREAS--PHYSICS
TOPIC TAGS--ORDERED ALLOY, BINARY ALLOY, THERMODYNAMIC ANALYSIS, HEAT OF
FORMATION, ENTROPY, FREE ENERGY, MATHEMATIC MODEL
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
PROXY PFEL/FRAME--1989/1339 STEP NO--UR/0185/70/015/001/0143/0145
CIRC ACCESSION NO--AP0107812
7777777777 UNCLASSIFIED

2/2 026

UNCLASSIFIED

PROCESSING DATE--11SEP70

CIRC ACCESSION NO--AP0107812

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A GENERAL EXPRESSION FOR THE ENERGY AND ENTROPY OF MIXING IN A BINARY ORDERED SOLN. WITH TWO TYPES OF NODES, WITHIN THE FRAME OF THE GORSKY BRAGG WILLIAMS MODEL, IS OBTAINED. A FORMAL EXTENSION OF THIS MODEL IS PROPOSED AND, ON THE BASIS OF THE THERMODYNAMIC THEORY OF ORDERING, A POSSIBLE TYPE OF FREE ENERGY DEPENDENCE ON THE ORDER DEGREE, IS DETD. AN ANAL. OF THE FORMALLY ENLARGED MODEL PREDICTIONS, REGARDING THE KIND OF THE ORDER DISORDER TRANSITION IS MADE.

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UNCLASSIFIED

USSR

UDC 577.4

FILATOV, O. I., PUGANOV, L. I.

"Planning and Warehouse Accounting for Material Values on a Computer"

V sb. Teoriya i praktika mash. obrabotki inform. (Theory and Practice of Machine Data Processing -- collection of works), Rostov-na-Donu, 1971, pp 30-34 (from RZh-Kibernetika, No 7, Jul 72. Abstract No 7V536)

No abstract

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Power, Turbine, Engine, Pump

USSR

UDC: 621.438.71.001.5

MANUSHIN, E. A., MIKHAL'TSEV, V. Ye., PUGIN, G. A., SOSENOV, Yu. V.

"An Experimental Turbine for a Gas Temperature of 1200°C With Two-Loop Air-Liquid Cooling"

Tr. Mosk. vyssh. tekhn. uch-shcha im. N. E. Baumana (Works of the Moscow Higher Technical Academy imeni N. E. Bauman), 1970, No 134, pp 133-140 (from RZh-Turbostroyeniye, No 8, Aug 70, Abstract No B.49.72)

Translation: On the basis of research at the Moscow Higher Technical Academy, the Leningrad "Ekonomayzer" Plant made an experimental semi-industrial pilot model of a high-temperature gas-turbine installation with air-liquid cooling of the working blades. In order to finish the cooling system, an experimental gas turbine was designed at the Moscow Higher Technical Academy, the full-scale dimensions of the blading being taken from the dimensions of the first stage of the cooled turbine in the high-temperature gas-turbine installation. A description is given of the stand and debugging tests of the experimental high-temperature gas-turbine installation at 4500-9000 rpm. An analysis of the thermal state of the guide vanes showed that the air cooling system, in reducing the vane temperature by 150-200°C, provides satisfactory cooling at temperature of up to 960°C. Six illustrations, one table, bibliography of three titles. L. P. D.

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USSR

UDC 621.365.82

PUGNIN, V. I., SEL'DIMIROV, I. M., SENYUTOVICH, E. G., and TEKUCHEV, A. N.

"A Study of the Effect of Xenon on the Size of the Population Inversion of Oscillatory Levels of the CO₂ Molecule in a Discharge in a Mixture of CO₂ + He + Xe"

Tr. Ryazan. Radiotekhn. in-ta (Proceedings of the Ryazan' Radiotechnical Institute), No 37, 1972, pp 69-77 RZh-Fizika, No 9, Sep 73, Abstract No 9D752

Translation: The effect of adding Xe on the amplification of a CO₂ gas discharge laser was studied. The degree of amplification was recorded as a function of the quantity of Xe and the electrical characteristics of the discharge. It is suggested that the effect of Xe on the population inversion occurs through the change of the electrical characteristics of the discharge: the temperatures and concentrations of electrons. Eight bibliographic citations.
Yu. M.

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USSR

UDC 669.295

MAL'KO, P. I., ARENSBURGER, D. S., PUGIN, V. S., NEMCHENKO, V. F., and L'VOV, S. N., Institute of Problems of Material Science, Academy of Sciences Ukr SSR, Kherson State Pedagogical Institute imeni N. K. Krupskaya

"Thermal and Electrical Properties of Porous Titanium"

Kiev, Poroshkovaya Metallurgiya, No 8, Aug 70, pp 35-38

Abstract: A study was made of the dependence of the coefficient of thermal conductivity, the thermal expansion, the thermoelectromotive force, and the resistivity of titanium on 0-50% porosity in the interval from room temperature to 1200° C. Thermal conductivity and electrical conductivity decreased with an increase in porosity. It was not possible to apply formulas of generalized conductivity for the determination of the dependence of thermal conductivity and electrical conductivity on porosity. This is explained by the coarseness of grain size of the initial powder (1-0.1 mm).

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Corrosion

USSR

UDC 620.193.01

ARENBURGER, D. S., PUGIN, V. S., BRYNZA, A. P., KOLOMOYETS, G. G., and PATRUSHEVA, A. G., Dnepropetrovsk State University, All-Union Scientific Research and Design Institute for Titanium, Zaporozhe, Institute of Problems of Material Science, Academy of Sciences UkrSSR.

"The Corrosion Behavior of Titanium Cermets in Mineral Acid Solutions"

Poroshkovaya Metallurgiya, No 4(100), Apr 71, pp 74-80

Abstract: Porous cermet materials having developed surfaces are subject to corrosion both externally as well as internally, which causes a deterioration in the physical-chemical properties. Study was made of the corrosion resistance of titanium cermets in hydrochloric and sulfuric acids solutions at temperatures of 20-80°C. The samples were prepared from titanium powder with a particle size range of $-0.25 + 0.1$ mm and $-0.18 + 0$ mm. The titanium powders were prepared by hydrogenation with subsequent degassing of the melt and by electrolytic refining of the waste titanium sponge. One set of samples was pressed under a pressure of 1.5 T/cm^2 and sintered at 1150° in pure argon for two hours. The other samples were sintered in vacuum at 1100°C for one hour. The specific surfaces of the 20% and 40% porous samples were determined and found to be 0.17 and $0.455 \text{ m}^2/\text{g}$, respectively.

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ARENSBURGER, D. S., et al., Poroshkovaya Metallurgiya, No 4(100), 1971, pp 74-80

Corrosion tests with sulfuric acid (5-91%) were carried out by incubating the samples at 40-80°C for 4-5 hours and at 20-30°C for 12-14 hours. Velocity of corrosion was found to be independent of time. A curve of the relation of the velocity of corrosion to acid concentration shows two maxima which correspond to 20 and 78% sulfuric acid; a minimum occurs at 50-60% sulfuric acid while with concentrations above 78%, the velocity decreases significantly. Titanium cermetes have little stability in sulfuric acid and the use of nitric acid as an inhibitor gave almost complete protection.

Titanium cermetes were stable at 20°C to 3% HCl; at increased concentrations, the corrosion increased rapidly. Comparison of results with both hydrochloric and sulfuric acids showed that the velocity of corrosion is inhibited by the presence of the Cl^- ion and activated by the $SO_4^{=}$ within a fixed time. At increased acidities, this is reversed and can be explained by the fact that the titanium sulfate which is deposited on the surface as a corrosion product is insoluble and prevents further degeneration.

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USSR

UDC 66.067.12

ARENSBURGER, D. S., PUGIN, V. S., and FEDORCHENKO, I. M., Institute of Problems of Material Science, Academy of Sciences, Ukrainian SSR

"Technology of Production and Properties of Porous Titanium-Molybdenum Alloy Materials"

Kiev, Poroshkovaya Metallurgiya, No 12, Dec 70, pp 39-42

Abstract: The alloy titanium-30% molybdenum has been found to be highly corrosion resistant in hydrochloric and sulfuric acids at high temperatures. Therefore, this alloy was used in experiments on the production of porous permeable materials. The technology of manufacture and properties of porous titanium materials of this alloy, designed to operate in hot acid solutions, were studied. A technology was developed for diffusion saturation of titanium powders with molybdenum, allowing the production of a corrosion-resistant coating on the surface of titanium particles. The porous permeable specimens manufactured of titanium powder which had been diffusion saturated with molybdenum also have high corrosion resistance and can be recommended for use in hot solutions of non-oxidative acids.

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USSR

UDC 532.135:621.762.4

KORNIYENKO, P. A., and PUGIN, V. S., Institute of Problems of Material Science, Academy of Sciences, Ukrainian SSR

"Study of the Structural and Mechanical Properties of Plastic Powder Mixtures, Report I"

Kiev, Poroshkovaya Metallurgiya, No 2, Feb 71, pp 57-62

Abstract: A study was made of the dependence of the structural and mechanical constants of plastic powder mixtures on the quantity of plasticizer (starch), particle form (spherical, aspherical), specific surface, and powder material. Twenty percent starch paste was used in the study. It was demonstrated that the powder particles are bonded with the plasticizer by adsorption, while the bonding between the particles themselves is by van der Waals-London forces through an interlayer of plasticizer in sectors with disrupted structure, having free surface energy. The influence of the quantity of plasticizer, specific surface, particle form, and powder material on the structural and mechanical properties of the plastic powder mixtures was analyzed. 1/1

1/2 039 UNCLASSIFIED PROCESSING DATE--20NOV70
TITLE--INVESTIGATION OF TITANIUM MOLYBDENUM POWDERED METAL ALLOYS -U-

AUTHOR--(03)-AKENSBURGER, D.S., PUGIN, V.S., FEDORCHENKO, I.M.

COUNTRY OF INFO--USSR

SOURCE--KIEV, POROSHKOVA METALLURGIYA, NO 4, APR 70, PP 32-38

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2/2 C39 UNCLASSIFIED PROCESSING DATE--20NOV70
CIRC ACCESSION NO--AP0125924

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE PHYSICOCHEMICAL AND PHYSICOMECHANICAL PROPERTIES OF POWDERED METAL ALLOYS BASED ON TITANIUM AND MOLYBDENUM (CONTAINING UP TO 50 WT. PERCENT MO) ARE REVIEWED, AND PRODUCTION TECHNOLOGY IS DISCUSSED. MOLYBDENUM POWDER (TYPE MCH) WITH A PARTICLE SIZE OF 5-7 MU, AND TITANIUM CALCIUM HYDRIDE, WITH A PARTICLE SIZE OF 56 MU, WERE USED IN THE INVESTIGATION. SPECIMENS, 40 TIMES 5 TIMES 4 AND 60 TIMES 5 TIMES 5 MM AND POROSITY 30 PLUS OR MINUS 1.5PERCENT, CONTAINING UP TO 50 WT. PERCENT MOLYBDENUM, WERE SINTERED IN ARGON AT 500-1400DEGREESC. THE HOLDING TIME AT THE SINTERING TEMPERATURE WAS 2 HRS AND THE SINTERED SPECIMENS WERE COOLED FROM 0.4 TO 12 HRS, WHICH CORRESPONDS TO A COOLING RATE OF 3,000 AND 100 DEG-HR. DATA ON THE SHRINKAGE, POROSITY, AND SPECIFIC ELECTRICAL RESISTANCE OF COMPACTS, DEPENDING ON THE CONTENT OF MOLYBDENUM AND SINTERING TEMPERATURE, ARE PRESENTED. A DIAGRAM OF MUTUAL DISSOLUTION OF TITANIUM AND MOLYBDENUM DURING SINTERING OF ALLOY TI33MO AND CORROSION RESISTANCE CURVES OF TITANIUM MOLYBDENUM ALLOYS AS A FUNCTION OF ALLOY COMPOSITION ARE SHOWN. THE CORROSION RESISTANCE OF ALLOYS WITH UP TO 50 WT. PERCENT MO IN 20PERCENT HCL AND 40PERCENT H SUB2 SO SUB4 SHOWS THAT POWDERED METAL ALLOYS OF THE COMPOSITION TI33MC, SINTERED IN ARGON AT A TEMPERATURE OF 1200DEGREESC, POSSESS THE HIGHEST CORROSION RESISTANCE. POWDERED METAL ALLOYS OF THIS COMPOSITION ARE RECOMMENDED FOR THE PRODUCTION OF POROUS PERMEABLE MATERIALS FROM TITANIUM MOLYBDENUM POWDERS. FACILITY: INSTITUTE FOR PROBLEMS OF MATERIAL SCIENCE, ACADEMY OF SCIENCES UKRAINIAN SSR.

UNCLASSIFIED

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ARENSBURGER, D. S., ~~PRIST~~ V. S., and FEDORCHENKO, I. M., Institute for Problems of Material Science, Academy of Sciences Ukrainian SSR

"Investigation of Titanium-Molybdenum Powdered Metal Alloys"

Kiev, Poroshkovaya Metallurgiya, No 4, Apr 70, pp 32-33

Abstract: The physicochemical and physicomachanical properties of powdered metal alloys based on titanium and molybdenum (containing up to 50 wt. % Mo) are reviewed, and production technology is discussed. Molybdenum powder (type MCh) with a particle size of $5-7 \mu$, and titanium calcium hydride, with a particle size of 56μ , were used in the investigation. Specimens, $40 \times 5 \times 4$ and $60 \times 5 \times 5$ mm and porosity $30 \pm 1.5\%$, containing up to 50 wt. % molybdenum, were sintered in argon at $500-1400^\circ \text{C}$. The holding time at the sintering temperature was 2 hrs and the sintered specimens were cooled from 0.4 to 12 hrs, which corresponds to a cooling rate of 3,000 and 100 deg/hr. Data on the shrinkage, porosity, and specific electrical resistance of compacts, depending on the content of molybdenum and sintering temperature, are presented. A diagram of mutual dissolution of titanium and molybdenum during sintering of alloy Ti30Mo and corrosion resistance curves of titanium-molybdenum alloys as a function of alloy composition are shown. The corrosion resistance of alloys with up to 1/2

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ARENSBURGER, D. S., et al, Poroshkovaya Metallurgiya, No 4, Apr 70, pp 32-38

50 wt. % Mo in 20% HCl and 40% H₂SO₄ shows that powdered metal alloys of the composition Ti₃₃Mo, sintered in argon at a temperature of 1200°C, possess the highest corrosion resistance. powdered metal alloys of this composition are recommended for the production of porous permeable materials from titanium-molybdenum powders.

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USSR

UDC 621.762.53

YURCHENKO, A. G., ~~BUGINA~~, I. I., and KOVAL'CHENKO, M. S.,
Institute of Problems of Material Science, Academy of Sciences,
Ukrainian SSR

"Hot Pressing of Materials With High Graphite Content"

Kiev, Poroshkovaya Metallurgiya, No 2, Feb 71, pp 37-39

Abstract: The purpose of this work was to study the process of hot pressing of metal-graphite compositions based on an iron-nickel alloy with 30 vol.% graphite and to determine the optimal technological modes for this process. Hot pressing of mixtures of powders of iron, nickel, and graphite was performed using a lever mechanical press in graphite molds at 1000 and 1100°C under pressures of 100, 150, and 200 kg/cm². It was established that the optimal hot pressing mode is 1100°C, 150 kg/cm². Use of this mode allows specimens with densities of 93-94% to be achieved. It is demonstrated that the compacting of materials in hot pressing can be described by volumetric viscous flow.

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USSR

UDC 621.785

SLYS', I. G., FEDORCHENKO, I. K., YERMAKOVA, YE. N., and PUGINA, L. I.,
Institute of Problems of Material Science, Ukrainian SSR Academy of Sciences

"Investigation of the Process of Sulfurization of Cermet Stainless Steels:
Report II"

Kiev, Poroshkovaya Metallurgiya, No 4, Apr 73, pp 37-43

Abstract: A new method of sulfurization of sintered materials is proposed and investigated. It is shown that for the process of sulfurization of stainless steels it is necessary to create conditions which will promote interaction of sulfur with alloy components. The conditions which increase reactivity of the alloy are: very long reaction surface, high concentration of defects of the alloy are: very long reaction surface, high concentration of defects of the crystalline structure, and heterogeneity of alloy microvolumes according to the chemical composition. The combination of sintering with sulfurization allows reduction of the temperature of sintering by 250-300°C. It is shown that sintered (in the presence of sulfur at 950°C) stainless porous steel is highly corrosion and wear-resistant during bearing contact.

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USSR

UDC 621.762.04:620.17

FEDORCHENKO, I. M., KORKH, L. M., PUGINA, L. I., PANFILOVA, I. A. and
RUDENKO, V. N., Institute of Problems of Material Science, Academy of
Sciences Ukrainian SSR

"Effect of Technological Factors on the Durability of Sulfidized Iron-
Graphite"

Kiev, Poroshkovaya metallurgiya, No 3, 1972, pp 99-105

Abstract: The strength properties of cermet materials after sintering are governed not only by the composition of the mixture but by a variety of technological factors as well. Varying the alloying efficiency of iron particles with carbon will almost double the strength of sulfidized iron-graphite; raising the dispersity of the starting powders four-fold may increase the material's strength by 30%; reducing the porosity from 30 to 1% will increase the strength characteristics of the material four to five times. Addition of zinc sulfide to alloy the particle contacts with zinc will raise the integral hardness by almost 30%. It has been established that the mechanism of strengthening cermet materials during plastic deformation is determined primarily by the material's initial porosity. (5 illustrations, 2 tables, 11 bibliographic references)

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USSR

UDC 620.183.48

ITIN, V. I., KOZLOV, Yu. I., PUGINA, L. I., YURCHENKO, A. G., SAVITSKIY, K. V. (Deceased), and FEDORCHENKO, I. M., Institute of Problems of Material Science, Academy of Sciences Ukrainian SSR

"Study of the Sintering, Structure and Phase Composition of Nickel Alloy-Base Metal-Graphite Materials. Report 1. Study of the Sintering Process of Nickel-Base Materials and Both the Structure and Phase Composition of Nickel-Copper-Graphite Alloys"

Kiev, Poroshkovaya metallurgiya, No 10, Oct 71, pp 26-31

Abstract: The study concerns the process of sintering as well as phase and structural changes occurring during sintering in Ni alloy-base metal-graphite materials. The experimental materials comprised 80% Ni and 20% Fe or 20% Cu with 30 and 50% (by vol.) graphite. The addition of graphite to Ni-Cu and Ni-Fe alloys markedly reduces both the amount of shrinkage and its rates during sintering. With 50% graphite the compression gives way to volumetric growth. Cu additions result in greater volumetric growth than Fe additions. The major cause of volumetric growth is believed to be the formation of inclusions isolated between particle surfaces, interaction with oxides to form gases, and desorption gases from the graphite resulting in a breakdown

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ITIN, V. I., et al., Poroshkovaya metallurgiya, No 10, Oct 71, pp 26-31

of contacts. Graphite additions cause the separation of Cu and Ni particles and reduce the alloy's homogeneity. In Cu-Ni alloy-base metal-graphite materials, graphite becomes an inert addition and spreads over the structure in the form of a separate inclusion in the metal matrix -- the solid solution of Cu in Ni. (5 illustrations, 5 bibliographic references)